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COMPLETE SPECIFICATION**Method and Apparatus for Producing a Tobacco Stream or Rod**

I, KURT KORBER, a German Citizen, of 10, Am Pfingstberg, Hamburg-Bergedorf, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a method and apparatus for producing a tobacco stream or rod by supplying tobacco directly or indirectly to a conveyor means by which the particles of tobacco are caused to be formed into a more or less compact stream, which is caused to pass through a channel-like duct, where it is subjected to a trimming operation at the exposed surface so that the cross-section of the stream leaving the trimming point is substantially uniform throughout its length. Cigarettes of uniform weight may be produced by forming said tobacco stream into a tobacco rod and then enclosing it in a strip of cigarette paper by means of the usual style of cigarette rod-forming device, the cigarette rod so produced being cut into individual cigarette lengths.

When a tobacco stream is being handled in this way it is important that the stream shall be subjected to a certain amount of constraint because at the comparatively high speeds at which the stream is travelling it may otherwise be difficult to prevent fibres from being torn out of the stream where it is subjected to trimming operations with the consequent formation of an irregular or non-uniform stream.

In all cases where a tobacco stream travelling in a duct is subjected to treatment such as trimming, steps must be taken to enable the tobacco stream to offer sufficient resistance to the influences applied to it whilst it is worked. Mechanism for handling a tobacco stream is known in which the sides and/or bottom of a U-shaped duct or guide move, for instance, at the same speed as the stream for

the purpose of improving the distribution of a tobacco shower delivered for instance from the distributor of a cigarette rod machine.

The present invention aims at providing an improved method of and means for conveying a tobacco stream through a zone where it is confined in a duct, to permit trimming operations to be performed on the stream, for removing tobacco from the surface, and in accordance with the present invention the stream is conveyed in a containing duct in which all the duct surfaces conveying the tobacco stream are moving with the stream, wherein said containing duct conveys the stream past a trimming device for removing tobacco from the surface of the stream to leave a stream of uniform section in the duct and wherein the moving duct surfaces are formed so as to exert an additional driving action upon the tobacco of the stream.

In an alternative method the moving duct surfaces are arranged so that suction is adapted to exert an additional driving action upon the tobacco of the stream.

Conveniently, suction is imparted through at least part of the walls of the duct which are air permeable, thereby to exert a holding action upon the tobacco stream, or adhesion between the duct and the stream or the "drive" of the stream within the duct is promoted by the provision of tines or spike-like elements in and moving with the duct. Thereby an additional driving action is imparted to the tobacco, beyond that obtainable merely by normal frictional contact with the duct walls.

The duct itself may be formed by applying one or more flexible belts in duct-like formation and guided upon a stationary confining member or upon a wheel, or it may be formed by the grooved periphery of a wheel.

The duct walls may be formed at least in part of air-permeable material and subjected to the action of suction to exert a drag on the

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tobacco being conveyed within the duct or the belt or belts providing the duct wall may be moved over one or more stationary suction boxes. Alternatively, part of the duct

5 may be provided with projecting tines or spikes extending into the tobacco stream.

By thus conducting the tobacco sliver through the said passage, as if passing it through a gauge, the result is achieved that the tobacco stream, which may be compacted to some extent uniformly or in spaced zones, will be able much better to withstand the pressures imposed upon it by the treatment means and, further, tobacco fibres are

15 not liable to be undesirably torn out of the constrained cross section.

Several embodiments of features illustrating the invention are shown diagrammatically in the accompanying drawing, in which:—

20 Figs. 1 to 5, 8 and 9 represent diverse forms of construction of a duct comprising one or several endless conveyor belts, and

Figs. 6, 7, 10 and 11 show alternative forms of ducts provided by a feed wheel.

25 In Fig. 1 the duct is provided by an air-permeable belt 1 formed to U-shape and guided in a guide channel 2, the duct being subject to suction as it passes over stationary suction boxes 3, 4 and 5. In this case it is assumed that the surface of the tobacco stream in the duct is to be trimmed level with the top face of the duct, and for this reason a cutting device is provided revolving in the direction of the stream and consisting of two overlapping rotary cutters 6

35 and 7.

Figs. 2 and 3 show a duct with a Vee-section and comprising two conveyor belts (8 in Fig. 2 and 9 in Fig. 3). The conveyor belts are guided in a Vee-section guide channel 10. In Fig. 2 only the lower regions of the conveyor belts 8 are permeable to the passage of air and subject to the effect of suction from associated stationary suction boxes 11 and 12. In Fig. 3 the conveyor belts 9 are permeable to air across the whole of their width and are exposed to the effect of suction boxes 13 and 14.

50 In Fig. 4 the duct is formed by an air-permeable endless bottom belt 15 and two endless conveyor belts 16 which form the sides. Below the upper run of the conveyor belt 15 is a suction box 17.

55 In Fig. 5 which illustrates the same three-belt arrangement as Fig. 4, not only the bottom belt 15 is arranged to be permeable to air, the two conveyor belts 18 which form the sides being likewise air-permeable and their runs facing the duct being associated with suction boxes 19 and 20.

60 Fig. 6 represents a section through part of a feed wheel 21 provided with a ring-shaped duct 22 around its periphery. The bottom of the duct 22 is formed by a perforated member 23, the space below which pro-

vides a suction chamber 24, or said space may accommodate a fixed suction box as in Figs. 1 to 5 so that suction is operative over part of the peripheral span of the feed wheel.

In the region in which the tobacco stream is to be trimmed two star wheels 24, 25 are provided which revolve in the direction of the stream, and a rotary cutter 26 is provided above them. These star wheels provide cover elements which virtually close the duct and revolve approximately at the speed of travel of the stream. Any projecting tobacco fibres are here held in position in the region of the working plane by both mechanical as well as by suction means. This arrangement thus ensures that when the projecting tobacco fibres are trimmed by the circular blade 26 the cross section of tobacco sliver contained in duct 22 will not be changed otherwise than by removal of tobacco from the surface.

The embodiment shown in Fig. 7 relates to a feed wheel in which not only the bottom 23 of the duct 28, but also the sides 28 of the duct are subjected to the effect of suction. To this end a suction chamber 24 is provided inside the feed wheel, and the latter moves relatively to a stationary suction box 27 and two further suction chambers or boxes 30 associated with each of the side walls.

The invention is not limited to the use of suction; Figs. 8 to 11 show further forms of construction of a duct without a suction holding provision, the required effect being here obtained by teeth or tines.

In Fig. 8 a belt 32, shaped in section in the form of a U in a guide channel 31, is provided in the central region with spikes or carding wires 33 which penetrate a substantial or the greater part of the cross section of the tobacco stream.

The embodiment shown in Fig. 9 corresponds in the arrangement of the belts with Fig. 4 excepting that the suction belt 15 is replaced by an endless carded belt 34.

Fig. 10 illustrates a feed wheel 35 with a peripheral groove 36, the base of which is provided with spikes or tines 37, or with a carded surface.

Fig. 11 represents a feed wheel 38 with a peripheral groove 39 containing a spiked belt 40, similar to that shown in Fig. 9, which covers the floor of the duct; this belt may be fixed in position or it may comprise part of the run of an endless carding belt, and which encircles part of the periphery of the wheel.

In the drawings the ducts are shown to be of approximately the same proportions in all cases, but contrary to what is shown in these illustrations, the depth will generally be less than the width in conveyors provided with spikes or carding surfaces. The ratio is in practice modified according to the purpose for which a tobacco stream is being conveyed,

and in some cases according to the shape of cigarettes to be produced from the tobacco stream.

In all cases the tobacco stream is subjected to a trimming operation, for example as shown in Figs. 1 and 6. The suction action exerted by the means shown in any of Figs. 1 to 7 may be cut off at the trimming point so that the tobacco stream is allowed to expand to some extent before trimming is performed, the suction action then promoting the feeding action of the tobacco stream.

WHAT I CLAIM IS:—

1. A method of manipulating a continuous mass of tobacco in the form of a compact and relatively coherent stream, in which said stream is conveyed in a containing duct in all the duct surfaces conveying the tobacco stream are moving with the stream, wherein said containing duct conveys the stream past a trimming device for removing tobacco from the surface of the stream to leave a stream of uniform section in the duct and wherein the moving duct surfaces are formed so as to exert an additional driving action upon the tobacco of the stream.

2. A method according to Claim 1, wherein the driving action upon the tobacco is exerted at points lying in planes above the base of the duct.

3. A method according to Claim 1 or 2 wherein the driving action exerted upon the tobacco is exerted by means of spiked elements extending into the duct.

4. A method according to Claim 3 wherein the base of the containing duct is provided with a closely spaced series of spikes or tines extending from the base of the duct into the tobacco conveyed thereby.

5. A method of manipulating a continuous mass of tobacco in the form of a compact and relatively coherent stream, in which said stream is conveyed in a containing duct in which all the duct surfaces conveying the tobacco stream are moving with the stream, wherein said containing duct conveys the stream past a trimming device for removing tobacco from the surface of the stream to leave a stream of uniform section in the duct and wherein the moving duct surfaces are arranged so that suction is adapted to exert an additional driving action upon the tobacco of the stream.

6. A method according to Claim 4 wherein the suction is exerted through the walls of the containing duct.

7. A method according to any of the foregoing claims, wherein the containing duct is adapted to support a single conveyor belt deformed into U-shape or similar section.

8. A method according to any of Claims 1 to 4, wherein the containing duct supports a plurality of belts, the surfaces of which are mutually arranged in U- or V-shape.

9. A method according to any of Claims 1 to 5, wherein the containing duct is provided by a peripheral groove in a feed wheel.

10. A method according to Claim 4 and any of Claims 5 to 7, wherein the containing duct houses one or more travelling conveyor belts which move over surfaces through which suction is applied to the conveyor belt, said conveyor belt or belts being perforated at the base of the duct and along at least part of the side wall thereof.

11. Apparatus for manipulating a continuous travelling mass of tobacco in the form of a compact and relatively coherent stream, comprising a containing duct within which said stream is conveyed, all the surfaces of said duct comprising surfaces moving in unison with the tobacco, and a trimming device past with the tobacco stream is moved to remove tobacco from the surface thereof to leave a stream of uniform section travelling within the duct, the moving duct surfaces being formed so as to exert an additional driving action on the tobacco of the stream.

12. Apparatus for manipulating a continuous travelling mass of tobacco in the form of a compact and relatively coherent stream, comprising a containing duct within which said stream is conveyed, all the surfaces of said duct comprising surfaces moving in unison with the tobacco, a trimming device past which the tobacco stream is moved to remove tobacco from the surface thereof to leave a stream of uniform section travelling within the duct, the duct surfaces being perforated and means being provided whereby suction exerts an additional driving action on the tobacco.

13. Apparatus according to Claim 11 or 12, wherein the walls of the duct are formed by one or more travelling conveyor belts to define a duct space of U- or V-section.

14. Apparatus according to Claim 11 or 12, wherein the containing duct is formed by a peripheral groove in a feed wheel.

15. Apparatus according to Claim 12, wherein the conveyor belt or belts is/are perforated and move over one or more suction chambers so that suction is exerted on the tobacco at the base of the duct and at various points of its length.

16. Apparatus according to Claim 11 wherein the base of the duct is formed with projecting tines or spikes penetrating the tobacco mass being conveyed in the duct.

17. Apparatus according to Claims 11 and 13 wherein the belt or one belt carries a plurality of projecting tines or spikes extending from the base of the duct into the tobacco stream.

WHEATLEY & MACKENZIE,
17, Wilson Street,
London, E.C.4,
Chartered Patent Agents.

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale

